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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/817,731	03/26/2001	Lars Johan Persson	15685P075	9458

8791 7590 10/19/2005

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EXAMINER	
GANDHI, DIPAKKUMAR B	
ART UNIT	**PAPER NUMBER**
2138	

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/817,731	PERSSON ET AL.	
	Examiner	Art Unit	
	Dipakkumar Gandhi	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-65* is/are pending in the application.

4a) Of the above claim(s) *1-40* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *41-65* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Amendment

1. Applicants' request for reconsideration filed on 07/28/2005 has been reviewed.

2. Amendment filed on 07/28/2005 has been entered.

3. Applicant's arguments with respect to claims 41-65 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1) in view of Anvari (US 5,461,646).

As per claim 41, Lundby et al. teach a method comprising: determining that an effective signal strength of a signal on a wireless communication link using signal diversity in one or more of the space, time or frequency domains is insufficient to provide a desired communication range; introducing signal diversity in an additional of the space, time, or frequency domains into the communication link to generate multiple signals corresponding to the signal on the communication link (col. 3, lines 21-24, lines 28-50, Lundby et al.).

However Lundby et al. do not explicitly teach the specific use of selectively combining the decorrelated signals and demodulating the combined, decorrelated signals to generate a representation of the content of the signal.

Anvari in an analogous art teaches wireless communication (col. 1, line 16, Anvari). Anvari teaches a diversity technique ... uncorrelated multipath fadings (col. 2, 50-54, Anvari). Anvari also teaches the digital receiver 10 ... space diversity (fig. 1, col. 4, lines 32-34, Anvari). Anvari teaches a plurality of spaced apart antennas ... flat fading (col. 5, lines 5-10, Anvari). Anvari teaches that the converter 40 shown in FIG. 3 is a quadrature demodulator, which is used to convert the IF, signal to a complex baseband signal (fig. 3, col. 5, lines 59-62, Anvari).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Anvari by including an additional step of selectively combining the decorrelated signals and demodulating the combined, decorrelated signals to generate a representation of the content of the signal.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to combine the signals received from multiple signal paths and convert the combined signal to a baseband signal for a user.

7. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1) in view of Anvari (US 5,461,646) and Tsujimoto (US 5,369,412).

As per claim 42, Lundby et al. teach a method comprising: providing a wireless communication link with a level of diversity; detecting a degradation of signal quality on the communication link; and dynamically introducing additional diversity on the communication link to result in the communication link having diversity in two or more of the space, time, or frequency domains in response to detecting the degradation of signal quality, to generate a plurality of signals (col. 3, lines 21-24, lines 28-50, Lundby et al.).

However Lundby et al. do not explicitly teach the specific use of generating a plurality of decorrelated signals to be selectively combined and demodulated to provide a representation of an originally transmitted signal.

Anvari in an analogous art teaches wireless communication (col. 1, line 16, Anvari). Anvari teaches a diversity technique ... uncorrelated multipath fadings (col. 2, 50-54, Anvari). Anvari also teaches the digital receiver 10 ... space diversity (fig. 1, col. 4, lines 32-34, Anvari). Anvari teaches a plurality of spaced apart antennas ... flat fading (col. 5, lines 5-10, Anvari). Anvari teaches that the converter 40 shown in FIG. 3 is a quadrature demodulator, which is used to convert the IF, signal to a complex baseband signal (fig. 3, col. 5, lines 59-62, Anvari).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Anvari by including an additional step of generating a plurality of decorrelated signals to be selectively combined and demodulated to provide a representation of an originally transmitted signal.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to combine the signals received from multiple signal paths and convert the combined signal to a baseband signal for a user.

Lundby et al. also do not explicitly teach the specific use of a weight vector.

Tsujimoto in an analogous art teaches that maximal diversity ... summer 11 (figure 1, col. 6, lines 59-65, Tsujimoto).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Tsujimoto by including an additional step of using a weight vector.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a weight vector would provide the opportunity to weight the signals received from different signal paths with different weight vectors and combining the weighted signals.

8. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646) and Tsujimoto (US 5,369,412) as applied to claim 42 above, and further in view of Worthy (US 6,643,494 B1).

As per claim 43, Lundby et al., Anvari and Tsujimoto substantially teach the claimed invention described in claim 42 (as rejected above).

However Lundby et al., Anvari and Tsujimoto do not explicitly teach the specific use of a method wherein the wireless communication link comprises an uplink to a communication station.

Worthy in an analogous art teaches that uplink 290 represents a wireless communication path from transceiver 280 to second antenna 40 of receiver section 64 (figure 10, col. 18, lines 25-27, Worthy).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Worthy by including an additional step of using a method wherein the wireless communication link comprises an uplink to a communication station.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a method wherein the wireless communication link comprises an uplink to a communication station would provide the opportunity to transmit signals from the transceiver to a communication station.

9. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646) and Tsujimoto (US 5,369,412) as applied to claim 42 above, and further in view of Molloy et al. (US 6,591,382 B1).

As per claim 44, Lundby et al., Anvari and Tsujimoto substantially teach the claimed invention described in claim 42 (as rejected above).

However Lundby et al., Anvari and Tsujimoto do not explicitly teach the specific use of a method wherein detecting the degradation of signal quality on the wireless communication link comprises determining that a signal quality characteristic of the wireless communication link has achieved a threshold value associated with the characteristic.

Molloy et al. in an analogous art teach that the system and method responds to low signal levels caused by weak and fading wireless connections. Molloy et al. also teach that the quality of service monitor monitors signal quality. The quality of service monitor detects a signal quality that falls below a predetermined threshold (abstract, Molloy et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Molloy et al. by including an additional step of using a method wherein detecting the degradation of signal quality on the wireless communication link comprises determining that a signal quality characteristic of the wireless communication link has achieved a threshold value associated with the characteristic.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to change the network resources depending on the signal quality on the wireless communication link.

10. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646), Tsujimoto (US 5,369,412) and Molloy et al. (US 6,591,382 B1) as applied to claim 44 above, and further in view of Agrawal et al. (US 5,722,051).

As per claim 45, Lundby et al., Anvari, Tsujimoto and Molloy et al. substantially teach the claimed invention described in claim 44 (as rejected above). Molloy et al. also teach a method wherein the signal quality characteristic includes one or more of a receive signal strength (col. 10, lines 24-25, Molloy et al.), a signal to noise ratio, SNR (col. 11, lines 62-65, Molloy et al.), a bit error rate, BER (col. 9, lines 11-12, Molloy et al.) a frame error rate, FER (col. 9, lines 60-63, Molloy et al.), signal to noise and interference ratio, SINR (col. 9, lines 33-34, Molloy et al.).

However Lundby et al., Anvari, Tsujimoto and Molloy et al. do not explicitly teach the specific use of a carrier to interference ration (CIR).

Agrawal et al. in an analogous art teach that the quality of service may be defined in terms of any of several parameters such as, for example, carrier-to-interference ratio (col. 5, lines 32-34, Agrawal et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Agrawal et al. by including an additional step of using a carrier to interference ratio (CIR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a carrier to interference

ratio (CIR) would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

11. Claims 46, 47, 48, 49, 50, 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646) and Tsujimoto (US 5,369,412) as applied to claim 42 above, and further in view of Chuang et al. (US 6,052,594) and Schuster et al. (US 6,170,075 B1).

As per claim 46, Lundby et al., Anvari and Tsujimoto substantially teach the claimed invention described in claim 42 (as rejected above).

However Lundby et al., Anvari and Tsujimoto do not explicitly teach the specific use of a method wherein introducing additional diversity comprises: communicating on a first channel of the wireless communication link and determining whether a second channel is available on the wireless communication link.

Chuang et al. in an analogous art teach that the present invention relates to a system and a method for wireless packet communications (col. 1, lines 9-10, Chuang et al.). Chuang et al. also teach that channels are assigned only when there are packets to be delivered (col. 1, lines 62-63, Chuang et al.). Chuang et al. teach that FIG. 2 shows a flow diagram of a process for scanning for available channels performed by a wireless station according to the present invention (figure 2, col. 7, lines 18-20, Chuang et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Chuang et al. by including an additional step of using a method wherein introducing additional diversity comprises: communicating on a first channel of the wireless communication link and determining whether a second channel is available on the wireless communication link.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to use diversity techniques to improve the data rate for the communication link.

Lundby et al., Anvari and Tsujimoto also do not explicitly teach the specific use of invoking repetition coding to transmit a repetition coded signal on the first channel and on the second channel of the wireless communication link to provide channel diversity.

However Schuster et al. in an analogous art teach that these mechanisms may involve adding redundant information to the data stream in an effort to enable a receiving end to reconstruct lost data. This process is commonly employed in wireless communications and is referred to as "channel coding". One of the simplest examples of a channel coder is a repetition coder, which calls for sending duplicates of each packet as a redundant packet (col. 4, lines 20-26, Schuster et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Schuster et al. by including an additional step of invoking repetition coding to transmit a repetition coded signal on the first channel and on the second channel of the wireless communication link to provide channel diversity.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to improve the data rate over the wireless channel.

- As per claim 47, Lundby et al., Anvari, Tsujimoto, Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach that a channel is a timeslot on a particular carrier frequency (col. 8, lines 37-39, Chuang et al.).

- As per claim 48, Lundby et al., Anvari, Tsujimoto, Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach introducing frequency diversity in the signal, wherein each timeslot is dynamically assigned to an independent carrier frequency (col. 7, lines 48-49, col. 8, lines 37-39, Chuang et al.).

Schuster et al. teach repetition-coded signal (col. 4, lines 20-26, Schuster et al.).

- As per claim 49, Lundby et al., Anvari, Tsujimoto, Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach determining whether a second channel is available comprises determining whether a timeslot is available (figure 2, col. 7, lines 18-20, col. 8, lines 37-39, Chuang et al.). Schuster et al. teach repetition coding (col. 4, lines 20-26, Schuster et al.).

- As per claim 50, Lundby et al., Anvari, Tsujimoto, Chuang et al. and Schuster et al. teach the additional limitations.

Lundby et al. teach a method wherein introducing additional diversity further comprises: enabling receipt of a signal via multiple channels and multiple receive paths (col. 3, lines 3-6, lines 42-50, Lundby et al.).

- As per claim 51, Lundby et al., Anvari, Tsujimoto, Chuang et al. and Schuster et al. teach the additional limitations.

Lundby et al. teach a method wherein enabling receipt via multiple receive paths comprises: receiving the signal through multiple antenna elements (col. 3, lines 21-27, Lundby et al.).

12. Claims 52, 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646), Tsujimoto (US 5,369,412), Chuang et al. (US 6,052,594) and Schuster et al. (US 6,170,075 B1) as applied to claim 50 above, and further in view of Altman et al. (US 3,195,049) and Balachandran et al. (US 5,881,105).

As per claim 52, Lundby et al., Anvari, Tsujimoto, Chuang et al. and Schuster et al. substantially teach the claimed invention described in claim 50 (as rejected above). Schuster et al. also teach repetition coded signal (col. 4, lines 20-26, Schuster et al.).

However Lundby et al., Anvari, Tsujimoto, Chuang et al. and Schuster et al. do not explicitly teach the specific use of a method wherein the signals to be selectively combined comprises a receiving component of the wireless communication link: performing initial spatial processing on a first channel by adding energy of signals associated with the channel via the multiple receive paths to form a composite signal of the associated signals and combining spatially processed composite signals associated with each of the channels.

Altman et al. in an analogous art teach one such diversity system ... single intelligence signal (col. 1, lines 28-47, Altman et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Altman et al. by including an additional step of using a method wherein the signals to be selectively combined comprises a receiving component of the wireless communication link: performing initial spatial processing on a first channel by adding energy of signals associated with the channel via the multiple receive paths to form a composite signal of the associated signals and combining spatially processed composite signals associated with each of the channels.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to improve the data rate over the wireless channel.

Lundby et al., Anvari, Tsujimoto, Chuang et al. and Schuster et al. also do not explicitly teach the specific use of performing an error control check on the composite signal and determining if the error control check on the composite signal fails.

Balachandran et al. in an analogous art teach that the CRC block encoding check does not match, i.e. the parity of the transmitted CRC bits does not correspond with that of the generated CRC (col. 10, lines 8-10, Balachandran et al.). Balachandran et al. teach that if the CRC block encoding check does not match, this indicates that the message is invalid (col. 10, lines 29-30, Balachandran et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Balachandran et al. by including an additional step of performing an error control check on the composite signal and determining if the error control check on the composite signal fails.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that performing an error control check on the composite signal and determining if the error control check on the composite signal fails would provide the opportunity to implement techniques to retransmit the signal if the error check fails, so that it is received correctly at the receiver.

- As per claim 54, Lundby et al., Anvari, Tsujimoto, Chuang et al., Schuster et al., Altman et al., and Balachandran et al. teach the additional limitations.

Altman et al. teach demodulating the composite signal (col. 1, lines 41-45, Altman et al.).

Balachandran et al. teach extracting error control information from at least a subset of the demodulated signal (col. 1, lines 65-67, col. 2, line 1, col. 10, lines 8-10, Balachandran et al.).

Balachandran et al. teach performing a cyclical redundancy check (CRC) using the error control information to determine whether the demodulated signal matches an originally encoded signal (figure 5, col. 10, lines 8-10, lines 29-31, Balachandran et al.).

13. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646), Tsujimoto (US 5,369,412), Chuang et al. (US 6,052,594), Schuster et al. (US 6,170,075 B1), Altman et al. (US 3,195,049) and Balachandran et al. (US 5,881,105) as applied to claim 52 above, and further in view of Chin et al. (US 6,694,155 B1).

As per claim 53, Lundby et al., Anvari, Tsujimoto, Chuang et al., Schuster et al., Altman et al. and Balachandran et al. substantially teach the claimed invention described in claim 52 (as rejected above).

Altman also teaches combining each spatially diverse signal representation of the channel received from the multiple receive paths (col. 1, lines 28-47, Altman).

However Lundby et al., Anvari, Tsujimoto, Chuang et al., Schuster et al., Altman et al. and Balachandran et al do not explicitly teach the specific use of utilizing maximal ratio combining (MRC).

Chin et al. in an analogous art teach that this approach, called maximal ratio combining (MRC) approach, is equivalent to keeping the main beam of the downlink beam pattern toward the intended user (col. 3, lines 2-5, Chin et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Chin et al. by including an additional step of using maximal ratio combining (MRC).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that utilizing maximal ratio

combining (MRC) would provide the opportunity to keep the main beam of the downlink beam pattern toward the intended user and increase the signal strength.

14. Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1) in view of Anvari (US 5,461,646), Tsujimoto (US 5,369,412) and Tolopka et al. (US 6,044,349).

As per claim 55, Lundby et al. teach operations including: providing a wireless communication link with a level of diversity; detecting a degradation of signal quality on the communication link; and dynamically introducing additional diversity on the communication link to result in the communication link having diversity in two or more of the space, time, or frequency domains in response to detecting the degradation of signal quality, to generate a plurality of signals (col. 3, lines 21-24, lines 28-50, Lundby et al.).

However Lundby et al. do not explicitly teach the specific use of generating a plurality of decorrelated signals to be selectively combined and demodulated to provide a representation of an originally transmitted signal.

Anvari in an analogous art teaches wireless communication (col. 1, line 16, Anvari). Anvari teaches a diversity technique ... uncorrelated multipath fadings (col. 2, 50-54, Anvari). Anvari also teaches the digital receiver 10 ... space diversity (fig. 1, col. 4, lines 32-34, Anvari). Anvari teaches a plurality of spaced apart antennas ... flat fading (col. 5, lines 5-10, Anvari). Anvari teaches that the converter 40 shown in FIG. 3 is a quadrature demodulator, which is used to convert the IF, signal to a complex baseband signal (fig. 3, col. 5, lines 59-62, Anvari).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Anvari by including an additional step of generating a plurality of decorrelated signals to be selectively combined and demodulated to provide a representation of an originally transmitted signal.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to combine the signals received from multiple signal paths and convert the combined signal to a baseband signal for a user.

Lundby et al. also do not explicitly teach the specific use of a weight vector.

However Tsujimoto in an analogous art teaches that maximal diversity ... summer 11 (figure 1, col. 6, lines 59-65, Tsujimoto).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Tsujimoto by including an additional step of using a weight vector.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a weight vector would provide the opportunity to weight the signals received from different signal paths with different weight vectors and combining the weighted signals.

Lundby et al. also do not explicitly teach the specific use of an article of manufacture comprising a machine accessible storage device having a plurality of executable instructions which, when executed, cause the executing machine to perform operations.

However Tolopka et al. in an analogous art teach a machine readable storage medium having stored thereon machine executable instructions, wherein execution of the machine-executable instructions is to implement a method (col. 10, lines 36-39, Tolopka et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Tolopka et al. by including an additional step of using an article of manufacture comprising a machine accessible storage device having a plurality of executable instructions which, when executed, cause the executing machine to perform operations.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to automate the operations and the operations will be implemented faster and accurately.

15. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646), Tsujimoto (US 5,369,412) and Tolopka et al. (US 6,044,349) as applied to claim 55 above, and further in view of Molloy et al. (US 6,591,382 B1) and Agrawal et al. (US 5,722,051).

As per claim 56, Lundby et al., Anvari, Tsujimoto and Tolopka et al. substantially teach the claimed invention described in claim 55 (as rejected above).

However Lundby et al., Anvari, Tsujimoto and Tolopka et al. do not explicitly teach specifically that detecting the degradation of signal quality on the wireless communication link comprises determining that one or more of a receive signal strength, a signal to noise ratio (SNR), a bit error rate (BER), a frame error rate (FER), signal to noise and interference ratio (SINR) of the wireless communication link has achieved a threshold value associated with the characteristic.

Molloy et al. in an analogous art teach that the system and method responds to low signal levels caused by weak and fading wireless connections. Molloy et al. also teach that the quality of service monitor monitors signal quality. The quality of service monitor detects a signal quality that falls below a predetermined threshold (abstract, Molloy et al.).

Molloy et al. also teach determining a receive signal strength (col. 10, lines 24-25, Molloy et al.), a signal to noise ratio, SNR (col. 11, lines 62-65, Molloy et al.), a bit error rate, BER (col. 9, lines 11-12, Molloy et al.) a frame error rate, FER (col. 9, lines 60-63, Molloy et al.), signal to noise and interference ratio, SINR (col. 9, lines 33-34, Molloy et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Molloy et al. by including additionally that detecting the degradation of signal quality on the wireless communication link comprises determining that one or more of a receive signal strength, a signal to noise ratio (SNR), a bit error rate (BER), a frame error rate (FER), signal to noise and interference ratio (SINR) of the wireless communication link has achieved a threshold value associated with the characteristic.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to change the network resources depending on the signal quality on the wireless communication link.

Lundby et al., Anvari, Tsujimoto and Tolopka et al. also do not explicitly teach the specific use of a carrier to interference ration (CIR).

However Agrawal et al. in an analogous art teach that the quality of service may be defined in terms of any of several parameters such as, for example, carrier-to-interference ratio (col. 5, lines 32-34, Agrawal et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Agrawal et al. by including an additional step of using a carrier to interference ratio (CIR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a carrier to interference ratio (CIR) would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

16. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646), Tsujimoto (US 5,369,412) and Tolopka et al. (US 6,044,349) as applied to claim 55 above, and further in view of Chuang et al. (US 6,052,594) and Schuster et al. (US 6,170,075 B1).

As per claim 57, Lundby et al., Anvari, Tsujimoto and Tolopka et al. substantially teach the claimed invention described in claim 55 (as rejected above).

However Lundby et al., Anvari, Tsujimoto and Tolopka et al. do not explicitly teach the specific use of introducing additional diversity comprising communicating on a first channel of the wireless communication link and determining whether a second channel is available on the wireless communication link.

Chuang et al. in an analogous art teach that the present invention relates to a system and a method for wireless packet communications (col. 1, lines 9-10, Chuang et al.). Chuang et al. also teach that channels are assigned only when there are packets to be delivered (col. 1, lines 62-63, Chuang et al.). Chuang et al. teach that FIG. 2 shows a flow diagram of a process for scanning for available channels performed by a wireless station according to the present invention (figure 2, col. 7, lines 18-20, Chuang et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Chuang et al. by including an additional step

of introducing additional diversity comprising communicating on a first channel of the wireless communication link and determining whether a second channel is available on the wireless communication link.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to use diversity techniques to improve the data rate for the communication link.

Lundby et al., Anvari, Tsujimoto and Tolopka et al. also do not explicitly teach the specific use of invoking repetition coding to transmit a repetition coded signal on the first channel and on the second channel of the wireless communication link to provide channel diversity.

However Schuster et al. in an analogous art teach that these mechanisms may involve adding redundant information to the data stream in an effort to enable a receiving end to reconstruct lost data. This process is commonly employed in wireless communications and is referred to as "channel coding". One of the simplest examples of a channel coder is a repetition coder, which calls for sending duplicates of each packet as a redundant packet (col. 4, lines 20-26, Schuster et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Schuster et al. by including an additional step of invoking repetition coding to transmit a repetition coded signal on the first channel and on the second channel of the wireless communication link to provide channel diversity.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to improve the data rate over the wireless channel.

17. Claims 58, 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1) in view of Anvari (US 5,461,646), Tsujimoto (US 5,369,412) and Molloy et al. (US 6,591,382 B1).

As per claim 58, Lundby et al. teach a communication system element comprising: a transceiver to establish a communication link over which to transmit and receiver communication signals in a communication session with a different system element; and a multidimensional diversity agent, coupled

to the transceiver, selectively introduce additional diversity on the wireless communication link to result in the wireless communication link having diversity in two or more of the space, time, or frequency domains (fig. 1, col. 3, lines 21-24, lines 28-50, col. 5, lines 14-20, Lundby et al.).

However Lundby et al. do not explicitly teach the specific use of detecting a degradation of signal quality on the wireless communication link.

Molloy et al. in an analogous art teach that the system and method responds to low signal levels caused by weak and fading wireless connections. Molloy et al. also teach that the quality of service monitor monitors signal quality. The quality of service monitor detects a signal quality that falls below a predetermined threshold (abstract, Molloy et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Molloy et al. by including an additional step of detecting a degradation of signal quality on the wireless communication link.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that detecting a degradation of signal quality on the wireless communication link would provide the opportunity to change the network resources depending on the signal quality on the wireless communication link.

Lundby et al. also do not explicitly teach the specific use of generating a plurality of decorrelated signals, to selectively combine the decorrelated signals, and to demodulate the combined signals to provide a representation of an originally transmitted signal.

However Anvari in an analogous art teaches wireless communication (col. 1, line 16, Anvari). Anvari teaches a diversity technique ... uncorrelated multipath fadings (col. 2, 50-54, Anvari). Anvari also teaches the digital receiver 10 ... space diversity (fig. 1, col. 4, lines 32-34, Anvari). Anvari teaches a plurality of spaced apart antennas ... flat fading (col. 5, lines 5-10, Anvari). Anvari teaches that the converter 40 shown in FIG. 3 is a quadrature demodulator, which is used to convert the IF, signal to a complex baseband signal (fig. 3, col. 5, lines 59-62, Anvari).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Anvari by including an additional step of

generating a plurality of decorrelated signals, to selectively combine the decorrelated signals, and to demodulate the combined signals to provide a representation of an originally transmitted signal.
This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to combine the signals received from multiple signal paths and convert the combined signal to a baseband signal for a user.
Lundby et al. also do not explicitly teach the specific use of a weight vector.
However Tsujimoto in an analogous art teaches that maximal diversity ... summer 11 (figure 1, col. 6, lines 59-65, Tsujimoto).
Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Tsujimoto by including an additional step of using a weight vector.
This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a weight vector would provide the opportunity to weight the signals received from different signal paths with different weight vectors and combining the weighted signals.

- As per claim 59, Lundby et al. Anvari, Tsujimoto and Molloy et al. teach the additional limitations.

Lundby et al. teach that the system element is a communication station, and wherein the additional system element is a subscriber unit (fig. 1, col. 5, lines 14-20, Lundby et al.).

18. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646), Tsujimoto (US 5,369,412) and Molloy et al. (US 6,591,382 B1) as applied to claim 58 above, and further in view of Agrawal et al. (US 5,722,051).
As per claim 60, Lundby et al., Anvari, Tsujimoto and Molloy et al. substantially teach the claimed invention described in claim 58 (as rejected above). Molloy et al. also teach that the agent to detect the degradation of signal quality on the wireless communication link comprises the agent to determine that one or more of a receive signal strength, a signal to noise ratio (SNR), a bit error rate (BER), a frame error rate (FER), signal to noise and interference ratio (SINR) of the wireless communication link has

achieved a threshold value associated with the characteristic (abstract, col. 9, lines 11-12, col. 9, lines 33-34, col. 9, lines 60-63, col. 10, lines 24-25, col. 11, lines 62-65, Molloy et al.).

Lundby et al., Anvari, Tsujimoto and Molloy et al. also do not explicitly teach the specific use of a carrier to interference ration (CIR).

However Agrawal et al. in an analogous art teach that the quality of service may be defined in terms of any of several parameters such as, for example, carrier-to-interference ratio (col. 5, lines 32-34, Agrawal et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Agrawal et al. by including an additional step of using a carrier to interference ratio (CIR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a carrier to interference ratio (CIR) would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

19. Claims 61, 62, 63, 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646), Tsujimoto (US 5,369,412) and Molloy et al. (US 6,591,382 B1) as applied to claim 58 above, and further in view of Chuang et al. (US 6,052,594) and Schuster et al. (US 6,170,075 B1).

As per claim 61, Lundby et al., Anvari, Tsujimoto and Molloy et al. substantially teach the claimed invention described in claim 58 (as rejected above).

However Lundby et al., Anvari, Tsujimoto and Molloy et al. do not explicitly teach the specific use of the agent to introduce additional diversity comprises the agent to: determine whether an additional channel is available on the wireless communication link.

Chuang et al. in an analogous art teach that the present invention relates to a system and a method for wireless packet communications (col. 1, lines 9-10, Chuang et al.). Chuang et al. also teach that channels are assigned only when there are packets to be delivered (col. 1, lines 62-63, Chuang et al.). Chuang et

al. teach that FIG. 2 shows a flow diagram of a process for scanning for available channels performed by a wireless station according to the present invention (figure 2, col. 7, lines 18-20, Chuang et al.).
Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Chuang et al. by including an additional step of using the agent to introduce additional diversity comprises the agent to: determine whether an additional channel is available on the wireless communication link.
This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to use diversity techniques to improve the data rate for the communication link.
Lundby et al., Anvari, Tsujimoto and Molloy et al. also do not explicitly teach the specific use of invoking repetition coding to transmit a repetition coded signal on the additional channel to provide channel diversity with an original communication channel on the wireless communication link.
However Schuster et al. in an analogous art teach that these mechanisms may involve adding redundant information to the data stream in an effort to enable a receiving end to reconstruct lost data. This process is commonly employed in wireless communications and is referred to as "channel coding". One of the simplest examples of a channel coder is a repetition coder, which calls for sending duplicates of each packet as a redundant packet (col. 4, lines 20-26, Schuster et al.).
Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Schuster et al. by including an additional step of invoking repetition coding to transmit a repetition coded signal on the additional channel to provide channel diversity with an original communication channel on the wireless communication link.
This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to improve the data rate over the wireless channel.

- As per claim 62, Lundby et al., Anvari, Tsujimoto, Molloy et al., Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach that a channel is a timeslot on a particular carrier frequency (col. 8, lines 37-39, Chuang et al.).

Chuang et al. teach introducing frequency diversity in the signal, wherein each timeslot is dynamically assigned to an independent carrier frequency (col. 7, lines 48-49, col. 8, lines 37-39, Chuang et al.).

Schuster et al. teach repetition-coded signal (col. 4, lines 20-26, Schuster et al.).

- As per claim 63, Lundby et al., Anvari, Tsujimoto, Molloy et al., Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach the agent to determine whether an additional channel is available comprises the agent to determine whether a timeslot is available (figure 2, col. 7, lines 18-20, col. 8, lines 37-39, Chuang et al.).

Schuster et al. teach repetition coding (col. 4, lines 20-26, Schuster et al.).

- As per claim 64, Lundby et al., Anvari, Tsujimoto, Molloy et al., Chuang et al. and Schuster et al. teach the additional limitations.

Lundby et al. teach the agent to introduce additional diversity further comprises the agent to: enable receipt of a signal via multiple channels and multiple receive paths corresponding to multiple antenna elements (fig. 1, col. 3, lines 3-6, lines 21-27, col. 5, lines 14-20, Lundby et al.).

20. Claim 65 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby et al. (US 6,356,528 B1), Anvari (US 5,461,646), Tsujimoto (US 5,369,412) and Molloy et al. (US 6,591,382 B1), Chuang et al. (US 6,052,594) and Schuster et al. (US 6,170,075 B1) as applied to claim 64 above, and further in view of Altman et al. (US 3,195,049) and Balachandran et al. (US 5,881,105).

As per claim 65, Lundby et al., Anvari, Tsujimoto, Molloy et al., Chuang et al. and Schuster et al. substantially teach the claimed invention described in claim 64 (as rejected above). Schuster et al. also teach repetition coded signal (col. 4, lines 20-26, Schuster et al.).

However Lundby et al., Anvari, Tsujimoto, Molloy et al., Chuang et al. and Schuster et al. do not explicitly teach the specific use of the agent to selectively combine the signals comprises the agent to: perform initial spatial processing on a first channel by adding energy of signals associated with the channel via the

multiple receive paths to form a composite signal of the associated signals; and combine spatially processed composite signals associated with each of the channels.

Altman et al. in an analogous art teach one such diversity system ... single intelligence signal (col. 1, lines 28-47, Altman et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Altman et al. by including an additional step of using the agent to selectively combine the signals comprises the agent to: perform initial spatial processing on a first channel by adding energy of signals associated with the channel via the multiple receive paths to form a composite signal of the associated signals; and combine spatially processed composite signals associated with each of the channels.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to improve the data rate over the wireless channel.

Lundby et al., Anvari, Tsujimoto, Molloy et al., Chuang et al. and Schuster et al. also do not explicitly teach the specific use of performing an error control check on the composite signal and determining if the error control check on the composite signal fails.

Balachandran et al. in an analogous art teach that the CRC block encoding check does not match, i.e. the parity of the transmitted CRC bits does not correspond with that of the generated CRC (col. 10, lines 8-10, Balachandran et al.). Balachandran et al. teach that if the CRC block encoding check does not match, this indicates that the message is invalid (col. 10, lines 29-30, Balachandran et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lundby et al.'s patent with the teachings of Balachandran et al. by including an additional step of performing an error control check on the composite signal and determining if the error control check on the composite signal fails.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that performing an error control check on the composite signal and determining if the error control check on the composite signal fails

would provide the opportunity to implement techniques to retransmit the signal if the error check fails, so that it is received correctly at the receiver.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dipakkumar Gandhi whose telephone number is 571-272-3822. The examiner can normally be reached on 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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